2. Move the meter and test lead to the first TGB to be tested. Route the test lead to the TMGB and connect the test lead to the TMGB. The other end of the test lead should still be connected to Terminal C2 from the Reference Test. Connect a short test lead (typically from the manufacturer) from Terminal C1 to the TGB to be tested.

3. Perform the Biddle Meter Resistance Test.

4. Record the resistance on the data sheet.

5. Attach the equipment bonding conductor from the panelboard (if the panelboard is located within the room) to the TGB and repeat the test. Record the resistance on the data sheet. The reading may be slightly less than the first reading.

6. Attach the equipment bonding conductor from the building steel (if applicable) and repeat the test. Record the resistance on the data sheet. The reading may be slightly less then the previous reading.

7. This completes the grounding system continuity test for this TGB. Leave the building steel and panelboard ground connected to the TGB. Repeat the test for all other TGBs.

8. Test results should be in the order of a few 10ths of an ohm (approximately 0.10 to 0.90). The measured value should decrease when the panelboard and building steel grounds are connected.

3.05 CABLE DOCUMENTATION

A. The Test Results Data Sheet shall be completed and submitted to the Owner prior to substantial completion of the Project.
B. The Test Results Data Sheet shall be used to record submit all test data. All information shall be typed on the sheet.
C. Provide the Owner with a Test Results Data Sheet for each TGB. Make copies of the form as necessary.

END OF SECTION

SECTION 18764 - TELEPHONE SYSTEM (PBX)

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes

1. All telecommunications equipment, required to provide telephone system indicated in Contract Documents.

1.02 SYSTEM DESCRIPTION

A. Overall Description: Digital private branch exchange programmable data telecommunications network providing features, functions, and provisions specified in this Section including telephones specified in this Section.

1. Includes labor, materials, equipment, services, and all operations required for complete installation of telecommunications equipment and systems and related work as shown on Drawings and specified in this section.

2. Provide new, unused equipment of latest design offered by manufacturer and field-proven; equipment in "alpha" or "beta" testing phases not acceptable.

3. Provide interface to existing and new sound racks for zone paging and all call including all wiring between school sound system and PBX.

B. Requirements and Features - Telephone System A / Telephone System B

1. System

a. Allows or denies features at 3 levels:

(1) System basis.
(2) Customer basis for all consoles, sets, and trunks.
(3) Individually for each console, set and trunk.

b. Provides for complete system maintenance check using built-in, self-diagnostic routines programmed to run every 24 hours, at time specified by Owner. Same or additional diagnostic routines capable of manual activation from maintenance terminal or designated maintenance all class of service telephone. If faults detected, error messages printed on maintenance terminal and recorded on History File.

c. Equipped with system monitoring and administration from terminal at remote site.

d. Accommodates expansion by simple addition of modules.

e. Nodes capable of remote location (max. 8.7 miles on single mode fiber).

f. Equipped with distinctive ringing allowing party receiving call to distinguish between internal call and outside call.

g. Universal port/slot configuration for flexibility of using trunk or station cards in each system slot.

h. Connected to public telephone trunk lines through FCC approved central office interface with public telephone calls received by system and routed to designated attendant console and to designated telephones.

i. Equipment able to convert to next generation IP telephony by changing only main controller and utilize traditional TDM equipment to protect Owner's original investment.

j. QSIG Compliance – ISO networking specifications compliance.

k. Capable of simultaneous voice and data transmission from single telephone.

2. Telephone

a. Provides individual telephones, programmable for following options:

(1) Receive incoming phone calls.
(2) Receive incoming phone calls directly from outside without intervention from attendant(s).
(3) Receive inter-building calls only.
(4) Allow direct outside dialing.
(5) Allow multiple levels of restricted outside dialing.
(6) Allow inter-building dialing only.
(7) Allow emergency paging.
(8) Allow zone paging only.
(9) No paging access.
(10) Receive public calls only when transferred by the attendant.
(11) Initiate priority calls.
(12) Unrestricted outside dialing.

b. Attendant position and administrative telephones installed in locations selected by Owner and available for both public and inter-building communications.

3. PBX (including serving handset functions):

a. Centralized attendant answering.

b. Provides ability to:

(1) Restrict use of phone system on per phone, per trunk basis.
(2) Restrict calls on per station, per trunk, per exchange and/or per area code basis.
(3) Alter station's class of service on phone-by-phone basis as directed by Owner
(4) Enable caller away from his desk to override any restrictions on that phone, changing class of service to his own phone's class of service for duration of call.

c. Includes following features:

(1) Ability for user to relocate his own phone to compatible type location without outside intervention from equipment supplier.

(2) Capability for phone to appear busy while allowing user to make calls.

(3) Ability to activate features without use of "hook-switching".

(4) Menu-driven access for calling features and messaging features.

(5) Select-number redial allowing station user to store last number dialed. Other calls initiated and received without erasing stored number.

(6) Capability of notifying user that previously busy extension number or trunk called earlier is now available. Call completed using self-identifying access button that, when depressed, redials extension number or trunk.

(7) Ability to reroute calls made to busy and/or unanswered extension to predetermined location or locations.

(8) Conference calls established by any telephone.

(9) Automatic route selection of outgoing calls.

(10) Ability to display internal extension number or external telephone number of calling or called party.

(11) Ability to display ANI/DNIS numbers (caller ID) at digital display sets as well as analog single line sets with display or caller ID box.

(12) Executive override permitting assigned administrative telephone to "break in" on-going conversations in system and field-programmable without modification or additional equipment.

(13) Provision of private lines to individual phones and private lines to be shared by select group of phones.

d. Includes "Night Answer" providing ability to redirect public telephone lines during "Night Mode" to specific telephone sets, bell ringers or paging speakers with redirected calls answerable by one or more individuals by pressing button or dialing code.

e. Includes Call Accounting with ability to charge incoming or outgoing calls to specific account code and record following information about selected calls.

(1) For each call, CDR identifies:

(a) Calling and called parties.
(b) Start time of call.
(c) Duration of call.
(d) Month and date.
(e) Route (trunk group) number.
(f) Attendant handled.
(g) Account code.
(h) Authorization code.
(i) Cost of call.

(2) Record describing complete call output by switch when call is terminated using standard RS-232 type interface.

f. Include Station Administration: Utilizing Windows operating system and GUI interface allows for station configuration tasks such as moves, adds and changes. Must be able to install on the Owners LAN.

g. Provides for storage of diagnostic results, traffic statistics, software error, and other system messages, printable upon request through local or remote access.

h. Includes provisions to connect:

(1) PRI/BRI ISDN trunks.
(2) T1 carrier lines directly, without requiring channel banks.
(3) Two-wire DTMF trunks.

(4) Two-wire pulse or DTMF tie trunks.
(5) Two-wire ring down.
(6) Four-wire digital.
(7) OPX circuits.

i. Includes provisions to interconnect multiple PBX's together.

j. Includes main control unit capable of storing information and giving reports on features, restrictions, hunting patterns, service call information, etc. upon request either on site or remotely.

k. Includes central switching exchange providing RS-232 port for connection of on-site or off-site diagnostics by distributor or factory personnel allowing determination of circuit and software faults via diagnostics to facilitate remote software repairs to system.

(1) System maintains history file containing running tally number of operations of main system functions for use by individual administrating system.
(2) Port also useable for programming and saving of all programmed data for each system using on-site or off-site computer.

l. Provides compatibility with Emergency 9-1-1 System. Caller dialing either 911 or 9-911 automatically routed over local (analog) trunk to public emergency answer center. Caller from room phone directed to designated internal display telephone that rings continuously until manually cleared. Display contains extension number placing 911 calls.

m. Compatible with Enhanced 911.

n. Transfers to dedicated alternate power source in event of commercial power failure with minimum two-hour battery backup included at each site. (Back up system includes Voice Mail and Call Accounting systems).

o. Includes Power Failure Transfer Units at each site providing emergency service for up to 8 designated 500/2500 type sets by connecting directly to Central Office trunks.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's product brochures and other data for each specified telecommunications item demonstrating compliance with specified requirements and provide list of locations where each item is installed.

B. Shop Drawings: Submit complete drawings showing entire system, components, point-to-point wiring, and field connections.

C. Samples: Submit telephone system PBX/key system active components including system bill of materials.

D. Quality Control Submittals

1. Certificates: Submit verification from manufacturer that Contractor is "Certified Installer" of manufacturer's product line.
2. Installer Experience Listing: Submit list of names, locations, and size of 10 recent successful installations in local area of Project.

1.04 QUALITY ASSURANCE

A. Qualifications

1. Supplier: Ensure supplier is accredited by proposed equipment manufacturers and is prepared to offer service contract for system maintenance specified below.

2. Installer: Ensure installation and start-up of all systems accomplished under direct supervision of local company regularly engaged in installation, repair, and maintenance of similar systems with at least 10 recent successful installations in local area of Project.

1.05 PROJECT/SITE CONDITIONS

A. Existing Conditions: Obtain additional detail drawings of existing conditions from Owner as required for installation.

1.06 SEQUENCING AND SCHEDULING

A. Coordination with Owner

1. Coordinate requirements for access to buildings, equipment, and facilities with Owner sufficiently prior to requirement for access to avoid delay in telephone system installation.
2. Determine Owner's schedule for inspections provided by Owner sufficiently in advance of required inspections to avoid delay in telephone system installation.

B. Coordinate all work with Local and Long Distance Carrier Representative for all interconnects, disconnects and new leased circuits.

C. Coordinate all interviews with Owner to determine system wide and individual station features and functions.

D. Provide schedule of cutover. Keep existing equipment in operation until new equipment is programmed and cutover.

E. Obtain approval of Architect before proceeding with installation requiring cutting into or through any part of building structure such as girders, beams, concrete or tile floors, or partition ceilings.

1.07 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's system warranty against electrical or mechanical defects for minimum of 1-year from date of final acceptance.

1.08 MAINTENANCE

A. Maintenance Service: On completion of warranty period, provide maintenance agreement with 24 hours per day service, with 24-hour non-emergency service response time, and 1-hour emergency call response time on 365-day-per-year, 24 hours per day basis.

PART 2 - PRODUCTS

2.01 TELEPHONE SYSTEM

A. Manufacturers and System Configuration

1. Specified Manufacturer - For convenience, details and specifications have been based on "Toshiba CTX100 12x24 Phone System" by Toshiba Telecommunications Systems

2. Provide (1) PBX at each location listed on attached spreadsheet.

3. Each PBX to minimally contain the following configuration:

   a. [1] ea. dual port, digital trunk card for connection of T-1/ PRI circuit.
   b. [1] ea. analog trunk cards for a total capacity of 8 ea. analog trunk ports for connection of analog trunks.
   c. [16] port, full feature digital telephone cards to control new digital telephone devices as listed on attached spreadsheet.
   d. [16] port, full feature analog telephone cards to control new analog telephone devices as listed on attached spreadsheet
   e. includes minimum 3 open card slots for addition of station/trunk cards.
   f. Software: "CTX100 StrataNet". (If more recent Software Release is available, it must be provided)

4. Other manufacturers offering products complying with specified requirements include:

   a. Avaya, Inc.
   b. Mitel Corporation.

B. Voice Mail - Fully Integrated Voice Processing (Automated Attendant, Voice Messaging) capability similar to Toshiba Stratagy 24-8.

1. Provide Windows based, integrated voice processing system. See attached spreadsheet for minimum quantities of ports, users and hours of storage. (Note: Ports dynamically allocated for automated attendant and voice mail functions.) Proposed systems have following minimum service parameters:

   a. Mailbox Message Time ..... 1 to 180 Minutes
   b. Mailbox Message Retention ..... 1 to 365 Days
   c. Greeting Length..... 1 to 10 Minutes

2. System supports following features:

   a. Day and time stamp.
   b. Immediate reply.
   c. Alpha and numeric directory.
   d. Off-Premise notification.
   e. Pager/beeper notification.
   f. External Volume Control.
   g. Variable length passwords.
   h. Variable length security codes.
   i. Information mailboxes.
   j. Single digit access to at least 4 "trees" with 10 menu levels per tree and 8 options per menu level.
   k. General Delivery mailbox.

l. Message waiting indicators.
m. Non-blocking of new messages when mailbox is "full".
n. On line tutorial, full voice instructional prompts.
o. Interruptible prompts.
p. Zero-out to variable locations.
q. Variable greetings for time of day/holiday greetings
r. Auto Attendant blocks calls to specific extensions during fixed time of day
s. Distributed messages by group.

3. System includes context-sensitive help available at all times with help prompt structure describing:

   a. Current situation.
   b. Alternative actions.
   c. How to initiate other transactions.
   d. Initial mailbox/greeting set up

4. System Administration:

   a. System supports following System Administration functions through telephone set and GUI (graphical user interface) on PC.

      (1) Adding or Deleting Mailboxes.
      (2) Resetting Passwords.
      (3) Adding or Modifying Group Lists.
      (4) Setting Time and Date.
      (5) Printing Alarm Reports.
      (6) Ability to easily change Auto Attendant greeting locally or remotely.
      (7) System Administrator can select, by user, time period for already read messages to be automatically deleted. Messages can also be retained indefinitely.

   b. Management functions are Windows based and include on-line help.

   c. Multiple simultaneous administrative sessions.

   d. System must be able to connect to Owners LAN//WAN to allow for administrative changes and system monitoring from multiple points via intranet or the Internet.

5. Unified Messaging: Gives users ability to merge voice mail, fax and email messages into single interface.

   a. Allows users to playback voice mail messages through a telephone or speakers on a multimedia computer.
   b. Voice mail Messages can be stored on a PC or forwarded as a wave file in an email attachment.
   c. Allows faxes from users workstation (PC). Provide password-protected access to incoming faxes and allow outbound faxes from any Windows application.

6. Speech Activated Messaging: Speech recognition interface for managing messages from any location. This allows users to use speech commands to navigate through their mailbox to play, store, forward, etc. messages in voice mailbox.

7. Provide all necessary hardware (PC, etc) for a complete operating system.

C. Call Detail Recording: PC-based Call Accounting System, designed to interface with proposed PBX Network. System providing collection, storage, analysis and processing of SMDR information on Owners' premises. System gathers calls from all locations and records them on centralized PC connected to PBX through RS-232 communication port. Includes Pentium workstation with minimum of 24MB RAM and at least 1.0 GB Hard Drive running Windows.

1. Provide following standard reports:

   a. Extension Detail.
   b. Extension Analysis by Hour.
   c. Extension Summary by Department.
   d. Organization Summary.
   e. Department Summary.
   f. Account Code Detail.
   g. Account Code Summary.
   h. Missing Account Code.
   i. Alert Call Detail.
   j. Calls Over Specific Cost.
   k. Calls Over Specific Length.
   l. Calls to Specific Numbers.
   m. Full Call Detail by Organization.
   n. Most Frequently Dialed Numbers.
   o. Most Costly and Longest Calls by Extension or by Organization.
   p. Directories.
   q. Trunk Utilization by Detail, Summary or Hour.
   r. Call Summary by State.
   s. Alert Number Listing.
   t. Full Directory by Name.
   u. Costing Method Assigned to Trunks.
   v. Full Directory by Extension.
   w. Full Account Code List.

D. Personal Call Manager - Utilizing Windows operating system with GUI interface or Web browser interface allows for station configuration tasks such as moves, adds and changes. Maintenance terminal for use by the District System Administrator to implement said tasks.

1. Station Administration; system software to include the following for station administration:

   a. Telephone graphics
   b. Call party name display
   c. Automatic terminal number and directory number assignments
   d. Telephone set configuration and feature changes
   e. Global changes
   f. Telephone templates
   g. Comprehensive station selection/search
   h. Comprehensive reporting features
   i. Export capabilities

2. System Terminal includes following minimum characteristics:

   a. Intel TM Pentium II TM
   b. 64 MB RAM
   c. Minimum 2 GB hard drive with 500 MB free space
   d. 3.5 floppy drive
   e. 12X CD ROM drive
   f. Ethernet NIC
   g. Soundblaster card

h. 512 Cache memory
i. 14" color monitor, keyboard, mouse

3. Web Based Station Configuration Management: Allows District System Administrator to change telephone features and key assignments through Web Navigator. End Users, where permitted by system administrator, can view their phone feature assignments and make assignment changes as well as receive help on feature use and activation.

E. Digital Telephones - Similar to "Toshiba DKT2020-FDSP Telephone" and including following features:

1. 12 self-labeled programmable line/feature keys with indicators.
2. 4 context-sensitive programmable feature keys
3. User programmable, variable ring tones.
4. Fixed hold, good-bye and feature keys.
5. LED message-waiting indicator.
6. Independent volume control for handset, ring, and on hook dialing.
7. Built in Hands-free.
8. Direct connect headset port
9. 5 line by 24 character display
10. Personal Directory
11. Optional expansion modules
12. 2 accessory ports for application modules
13. Desk or wall mount.
14. All sets available in ash or black.
15. Locations to be determined in field.

F. Analog Telephones - Similar to "Toshiba DKT3010-SD Telephone".

1. Wall mount
2. Touchtone
3. "Tap" button(or Flash button), simulates hook switch flash for ease of feature activation
4. Available in ash or black.
5. Locations to be determined in field

2.02 COMPONENTS AND ACCESSORIES

A. Wall Mounting Boards: 3/4-inch plywood, painted all sides with fire retardant paint.

B. Site Event Buffer Box

1. Host Location: Similar to Teltronics Site Event Buffer -II

a. Basic data collection (CDR records, traffic statistics, PBX diagnostic routines)
b. Remote event reporting
c. Supports multiple host devices (PBX, voice mail, etc)

2. Remote locations: Similar to "Teltronics Site Event Buffer Jr."

a. Data collection
b. Data screening
c. Remote reporting

C. Uninterruptible Power Systems

1. *Remote Locations: Similar to "APC Smart-UPS 1000 XL Model # SU1000XLNET" and* appropriate "SU24XLBP" battery packs.
2. Host Location: Similar to "APC Smart-UPS 2200 XL Model # SU2200XLNET" and appropriate "SU48XLBP" battery packs.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions (by Installer): Examine conditions under which telephone system is to be installed and notify Prime Contractor in writing of any conditions detrimental to proper and timely installation. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

1. Notify Owner in writing of any conditions not strictly complying with laws, ordinances, and rules specified in this Section.

3.02 INSTALLATION

A. Ensure telecommunications systems and equipment specified in this Section are installed in strict accordance with requirements of rules, local law and ordinances of State of New Jersey National Board of Fire Underwriters, and National Electrical Code and that systems and power supplies are Underwriter Laboratory (UL.) approved.

1. Obtain Owner's and Architect's written consent before making changes in Contract Documents.

B. Install equipment in accordance with manufacturer's specifications for system.

1. Conduct tests and inspections after installation has been completed to assure Owner that requirements for installation have been met.
2. Promptly notify Architect of completion of work on equipment ready for inspection at least 1 week prior to completion.
3. Promptly correct all defects.

C. Distribution Frame Installation: Locate telephone system control units as indicated on Drawings and as required for complete system integration.

D. Power Requirements - Provide:

1. 120 Volt power on dedicated circuit
2. Separately wired building ground
3. Single-person contact

3.03 FIELD QUALITY CONTROL

A. Tests: Perform testing under direct supervision of representatives of accredited agencies for all specified equipment and services.

1. Notify Architect in writing 3 days prior to testing, to allow Architect to observe or participate in testing.

2. Demonstrate minimum acceptable signals, levels, audible and visual qualities as required by Owner's representative and Architect.
3. Submit written test report from authorized representative of equipment manufacturer indicating system has been tested and is in working order prior to final inspection by Architect.

3.04 ADJUSTING / CLEANING

A. Repair all damage to building resulting from installation of telecommunications systems and equipment, and exercise reasonable care to avoid any damage to existing construction. Report to Owner any damage to existing construction. Provide full clean up of all installation areas and removal of all debris. Refer to Division 1 for additional requirements.

3.05 DEMONSTRATION

A. On-Site Training

1. Provide all training by manufacturer's authorized representative who is professional system programmer and user trainer familiar with Owner's customized telephone system. Train users on Owner's customized telephone system.

   a. Coordinate with Owner to schedule employees attending training sessions.

2. Station User Training: Prior to telephone system cutover, provide on-site classroom-style training sessions at each location for each telephone type for all Owner staff.

   a. Classroom sessions limited to 15 people per session and approximately 1 hour each session.
   b. Provide live demonstration telephones of each type for attendees' use during training sessions.
   c. Instruct users in telephone feature use and activation, including Voice Mail use and feature activation.

3. Attendant Training: Prior to telephone system cutover, provide on-site classroom sessions for all telephone systems attendants with maximum 3 people per session for approximately 2 hours per session.

   a. Provide live demonstration telephones and attendant set for attendee's use during training session.
   b. Instruct users in console feature use and activation, including Voice Mail use and feature activation.

4. System Administration Training - PBX, Voice Processing, CDR: Within 3 weeks before system cutover, provide on-site training for at least 3 employees designated by Owner for at least 3 full days (8-hours) including:

   a. PBX System Administration: Including (but not limited to) moves, adds, and changes of stations; station features, restriction levels, and account codes; and printing and reading of station details, traffic reports and directories.

   b. Voice Processor: Including (but not limited to) adding and deleting mailboxes, changing name assignments, and changes to auto attendant greetings.

   c. Call Detail Recording: Including (but not limited to) retrieving and printing reports, inputting pricing information, and trunk analysis.

   d. Review of Owner Specific Manual.

5. Additional Training: Schedule as directed by Owner additional training day (8 hours) approximately 30 days after cutover to review any user issues.

6. "Hot Line": Provide "Hot Line" extension for users to call to receive assistance on phone use, voice mail use etc., answered by trained technician with voice mail box assigned for back up. Provide "Hot Line" for minimum of (10) business days after cutover (coordinate disconnect time with Owner). During "hotline" period, minor feature changes such as call pick up group assignments, extension number appearances, etc. provided at no extra charge to Owner.

B. Off-Site Training: Provide Owner with schedule of off-site manufacturer's training sessions for additional more detailed system training. Include course descriptions and fees.

C. Documentation

1. User Guides: Provide user guides for all telephone sets in quantity equal to quantity of sets plus 15 percent for each set type. Distribute guides as directed by Owner.

2. Directories: Provide Owner with typed directory, listing all extension numbers, voice mail box numbers and their name assignments, two weeks prior to cutover.

3. System Manuals: Provide full set of system documentation on-site at all locations at all times.

4. Owner Specific Manual - At System Administration training, provide Owner with manual containing following information:

   a. Customer ID numbers for all necessary equipment.

   b. Telephone numbers for service representatives and outline for service procedures.

   c. Telco information: Identification of RJ-21X, listing uses for all circuit numbers.

   d. Power failure transfer information, including trunk assignments and locations.

   e. Trunk configuration, including line assignment, type, route/member number, access codes.

   f. Night answer detail including description of how "Night Answer" mode operates and locations of night answer extensions/ringers.

   g. Typewritten spreadsheet providing following station information

      (1) Extension number
      (2) Location
      (3) Set type
      (4) Restriction level
      (5) Call Pick up groups
      (6) Feature Assignments
      (7) Custom equipment (long coil/line cords, external ringers, etc)
      (8) Account codes

   h. Restriction Level Definition, providing list defining parameters of each restriction level.

   i. Voice mail directory (Name vs. Mailbox number)

   j. Quantity of spare set and trunk ports.

   k. Quantity of unplaced sets.

PART 4 – QUANTITIES

SCHOOL NAME	ADDRESS	SCHOOL TYPE	CONSTRUCTION TYPE	SQUARE FEET	CLASSROOMS	ANALOG PHONES (QUANTITY)	DIGITAL PHONES (QUANTITY)	PHONE SYSTEM SWITCH (TYPE)	VOICE MAIL (PORTS)	VOICE MAIL (HOURS)	VOICE MAIL (USERS)
Mildred B. Garvin MicroSociety Elementary School	1 Grove Pl. East Orange, NJ 07017	ES	New	61,250	18	18	18	Toshiba	8	100	36

END OF SECTION

SECTION 18772 - NETWORK EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes

1. Local area network (LAN) hardware, software, associated labor and engineering support.

1.02 SYSTEM DESCRIPTION AND SCOPE OF WORK

A. System Description

1. Local Area Network (LAN): Provide labor, materials, network equipment, services and operations required for complete installation of LAN compatible with Ethernet 10 Base T/F (10Mbs), Fast Ethernet 100 Base T/F (100Mbs), Gigabit Ethernet, and 10Gigabit Ethernet.

2. The network equipment package shall include:

   a. A switched Ethernet network with a full duplex Gigabit Ethernet Backbone and 10/100 switching to work area outlets. Server connectivity shall be switched dedicated full duplex 1000TX.

   b. Internet routers with Gigabit Ethernet, T1, or other connectivity requirements as indicated on plans and equipment lists.

   c. Full size chassis based 10/100/1000 Ethernet district core switch with layer 3 switching/routing, redundant WAN Gigabit Ethernet connections with 1000LX, SX, and ZX GBIC connectivity where shown.

   d. Small frame chassis based building core switch with layer 3 switching/routing, redundant WAN Gigabit Ethernet connections with 1000LX, SX, and ZX GBIC connectivity where shown.

   e. Stackable modular edge switches in the IDF Telecommunications rooms with a 1000SX full duplex gigabit Ethernet uplink to the building MDF core switch and 10/100 Base-TX ports for work area outlets.

   f. Ethernet Access Points for wireless access throughout the district or, if specified, in quantities shown on the plans and/or equipment lists.

   g. Power Protection Equipment (Uninterruptible Power Supply Equipment)

   h. Additional network equipment not listed above but included on the list of network equipment to be provided.

3. Provide implementation of the owner's current IP mapping to the new network equipment and system. Owner will furnish IP subnets, subnet masks, gateway settings, and IP addresses to the contractor. Contractor shall implement VLANS and subnets as specified.

B. Performance Requirements

1. Comply with applicable requirements in Local, State and Federal Codes and both TIA/EIA Standards and BICSI standards

2. Specified network equipment system derived from recommendations in recognized telecommunications industry standards, including following documents in their most current revision and version incorporated by reference:

   a. ANSI/TIA/EIA – 606, Administration Standard for Telecommunications Infrastructure of Commercial Buildings
   b. ANSI/TIA/EIA – 607, Commercial Building Grounding and Bonding Requirements for Telecommunications
   c. BICSI - TDMM, Building Industries Consulting Services International, Telecommunications Distribution Methods Manual (TDMM)
   d. National Fire Protection Agency (NFPA – 70), National Electrical Code (NEC)

3. Network Switching Equipment shall support the following Ethernet standards:

   a. IEEE 802.3, 10BaseT, and 10BaseF
   b. IEEE 802.3u, 100BaseTX, 100BaseFX
   c. IEEE 802.3z, 802.3x, & 802.3ab Gigabit Ethernet
   d. IEEE 802.3af Power over Ethernet
   e. VLAN Trunking/Tagging: IEEE 802.1q
   f. Spanning-Tree Protocol: IEEE 802.1d
   g. 802.1p Priority Queuing
   h. Gigabit EtherChannel

4. Network Switching Equipment shall support the following management standards:

   a. SNMP agent V.1 (RFCs 1155-1157)
   b. SNMPv2c
   c. Ethernet MIB (RFC 1643)
   d. Ethernet repeater MIB (RFC 1516)
   e. SNMP MIB II (RFC 1213)
   f. RMON (RFC 1757)
   g. Interface table (RFC 1573)
   h. Bridge MIB (RFC 1493)
   i. SMT 7.3 (RFC 1285)
   j. RADIUS
   k. Resource Reservation Protocol (RSVP) and RSVP+
   l. Dynamic Host Configuration Protocol (DHCP), and Domain Name System (DNS)
   m. Telnet, TFTP, and BOOTP for management access.

5. Network Switching Equipment shall meet the following safety and emissions requirements:

   a. UL 1950
   b. EN 60950
   c. CSA-C22.2 no. 950
   d. IEC 950
   e. FCC 15J Class A
   f. VCCI CE II
   g. CE Mark
   h. EN 55022 Class B
   i. CISPR 22 Class B

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's product literature, technical specifications, and similar information for following items demonstrating compliance with specified requirements.

1. All network switching equipment and components.
2. All Network Routing Equipment.
3. All Network Gateway Equipment.
4. Fiber optic patch cables.
5. Uninterruptible Power Supply Equipment and other Power Protection Equipment.
6. Rack configurations and wiring diagrams.
7. Network test equipment and test routines.

B. Quality Control Submittals:

1. Manufacturer Certification: Submit certification from manufacturer of products to be installed as part of this Project certifying that Installer is authorized by product manufacturer to install proposed products.

2. Installer Experience Listing: Submit list of at least 5 completed projects as specified below in "Quality Assurance - Installer Qualifications".

C. Contract Closeout Submittals: Comply with requirements of SECTION 01700, including submission of operating and maintenance instructions as item in "Operating and Maintenance Data" manual described in that section.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Qualified to provide and test data network equipment system specified in this Section, certified by manufacturer of products to be installed, and completed at least 5 computer network installations of similar or greater size, nature and complexity as specified for this project.

1.05 SEQUENCING AND SCHEDULING

A. Provide installation schedule demonstrating that existing equipment will be maintained in operation until new equipment is programmed and ready for use.

1.06 WARRANTY

A. Special Warranty: Provide manufacturer's system warranty against electrical or mechanical defects for 1 year from date of final acceptance. The warranty shall begin after the system has been totally configured, tested and accepted.

1.07 MAINTENANCE AND SERVICE

A. Maintenance Service: FOR A PERIOD OF 1 YEAR after final acceptance provide complete service for all installed components, including all labor and materials. Provide service calls on system and make any adjustments and/or repairs required at no additional cost to Owner.

B. Maintenance Service: Provide software application upgrades and firmware upgrades for all installed equipment while it is under contract for maintenance service.

C. Special Maintenance Service: FOR A PERIOD OF 1 YEAR after final acceptance provide 24 hour x 7 day x 4 hour response time and all labor and materials to service all critical components including all core (backplane based) switches, all routers, all gateways, all firewalls and all additional network equipment that provides voice (telephone) services.

D. Special Maintenance Service: FOR A PERIOD OF 1 YEAR after final acceptance provide 8 hour 5 day Next Business Day response for all stackable closet switches that do not qualify for coverage in paragraph C above.

E. Provide single point contact to obtain authorized service.

PART 2 - PRODUCTS

2.01 EQUIPMENT

A. Refer to quantity lists for all products to be provided.

2.02 TYPICAL CORE SWITCH

A. The switch shall be a 10/100/1000 based layer 3 Ethernet switch designed to allow modular expansion, multi-protocol support, redundancy, and firmware and memory upgrades.

B. The switch shall have a modular chassis to accept switching, routing, and supervisory modules.

C. The switch shall have the following redundancy features:

1. Redundant, hot-swappable load-sharing power supplies.
2. Redundant cooling fans.
3. Capability for Redundant Gigabit Ethernet Channel links between core sites.

D. The switch shall meet the following minimum hardware requirements:

1. Available switching bandwidth of 256 Gbps
2. Multilayer switching up to 210 Mpps
3. 8-slot modular chassis with support for WAN, IP telephony, & Layer 4-7 switching line cards.
4. 1.4 microsecond low latency shared memory architecture
5. Capable of providing Fast EtherChannel and Gigabit EtherChannel links and between switches.
6. Support for a minimum of 32,000 MAC addresses.
7. Modules and capability to provide Gigabit to work area outlets shall be available.
8. Modules shall have indicator lights for booting, temperature thresholds and failure.

E. The switch shall have redundant 120V power supplies.

F. Provide all required memory cards and IOS software to support modules.

G. Switch shall provide wire-rate IP, IPX and IP-multicast routing support.

H. Switch shall include a wire-rate traffic detection and classification, admission control, and access list.

I. The supervisory engine shall provide traffic differentiating QOS switching for voice, video, and data:

1. Policing – ingress and egress.
2. DSCP or TOS packet classification, shaping, marking, and queuing per port.
3. Later 2 MAC, 3 (IP), & 4 (TCP/UDP port) switching.
4. 4 levels of queuing per port.

J. The switch shall support the following multilayer switching and routing functions:

1. Open Shortest Path First (OSPF).
2. *Routing Information Protocol (RIP) Versions I and II.*
3. Static routes.
4. Route redistribution.
5. Hot Standby Router Protocol (HSRP).
6. Internet Group Management Protocol (IGMP) Version I and II.
7. Dynamic Host Configuration Protocol (DHCP) Relay.
8. Internet Control Message Protocol (ICMP).
9. Gateway Discovery Protocol (GDP).
10. ICMP Router Discovery Protocol (IRDP).
11. Bootstrap Protocol (BOOTP) Relay.
12. PIM (sparse and dense mode).

K. The initial switch port configuration shall be configured as shown on the plans and/or equipment lists and shall be equipped with a minimum of the following modules in addition to the required supervisory engine:

1. (48) 10/100 Base-TX RJ-45 module.

2. Provide module(s) with provisions to provide at least 16-ports for 1000Base-X GBIC connections. Provide Small Form Factor Module (SFM) GBICs and patch cables if module(s) are SFM.

3. (6) 1000 SX GBICs (minimum 2 GBICs will be used for spares).

4. (4) 1000 LX/LH GBICs for WAN connections (minimum 2 GBIC's will be used for spares).

5. (1) 16-port 1000Base-T RJ-45 module.

6. dual power supplies.

2.03 TYPICAL MODULAR SWITCH FOR SMALL CORE OR EDGE

A. The switch shall be a 10/100/1000 based layer 3 Ethernet switch designed to allow modular expansion, multi-protocol support, redundancy, firmware and memory upgrades.

B. The switch shall have at least a 3-bay modular chassis to accept switching, routing, and supervisory modules.

C. The switch shall provide 24 Gbps of switching fabric.

D. The switch shall support 24,000 MAC addresses and 250 port based VLAN's.

E. The supervisory engine shall provide traffic differentiating QOS switching for voice, video, and data:

1. Policing – ingress and egress.
2. DSCP or TOS packet classification, shaping, marking, and queuing per. port.
3. Layer 2 MAC, 3 (IP), & 4 (TCP/UDP port) switching.
4. 4 levels of queuing per port.

F. The switch shall have two interchangeable GBIC modules that accept SX, LX, ZX, 1000Base-T, and Gigabit stacking modules.

G. The switch shall accommodate (10) GBIC 1000Base-X ports depending on the model specified.

H. The switch shall have redundant 120V power supplies.

I. The initial switch configuration shall include the following modules:

1. (48) 10/100 Base-TX RJ-45 module.

2. Provide module(s) with provisions to provide at least 12-ports for 1000Base-X GBIC connections. Provide Small Form Factor Module (SFM) GBIC's and patch cables if module(s) are SFM.

3. (2) 1000 LX GBIC's.

4. (6) 1000 SX GBIC's.

2.04 TYPICAL STACKABLE EDGE SWITCH

A. The switch shall meet all the specifications of the modular small core/edge switch with the following exceptions:

1. The switch shall provide 8 Gbps minimum of switching fabric.
2. Layer 3 switching/routing shall be optionally available.
3. The switch will come with the standard (SMI) software image.
4. The switch shall have two interchangeable GBIC modules that accept SX, LX, ZX, 1000Base-T, and Gigabit stacking modules.
5. (48) 10/100 Base-TX ports (work area connections).

B. The initial switch configuration shall include the following modules:

1. (1) SX GBIC.

2.05 TYPICAL STACKABLE EDGE SWITCH – POWER OVER ETHERNET ENABLED

A. The switch shall meet all the specifications of the stackable EDGE switch with the following exceptions:

1. The switch shall provide 8 Gbps minimum of switching fabric.

2. The switch shall come with the standard (SMI) software image.

3. Provide inline IEEE P802.3af compliant in-line power provisions for (24) 10/100 Base-TX switch ports. IEEE P802.3af third party powered patch panels/switches shall be provided if the manufacturer requires so for their VOIP solution.

4. The switch shall have two interchangeable GBIC modules that accept SX, LX, ZX, 1000Base-T, and Gigabit stacking modules.

5. (24) 10/100 Base-TX ports (desktop connections).

B. Classify, prioritize and mark LAN IP traffic using up to eight hardware-based IP service class queues based on the following parameters:

1. Policing – ingress and egress.
2. DSCP or TOS packet classification, shaping, marking, and queuing per port.
3. Later 2 MAC, 3 (IP), & 4 (TCP/UDP port) switching.
4. 4 levels of queuing per port.

5. 802.1p priority.
6. VLAN ID.

C. The initial switch configuration shall include the following modules:

1. (1) SX GBIC (type A or B switch connection).

2.06 TYPICAL ROUTER

A. This router shall be used to connect to ISP and/or WAN as indicated on plans and/or equipment lists.

B. The equipment provide the following features and minimum capabilities:

1. System throughput up to 40,000 pps between segments.
2. Multi-protocol routing: serial, ISDN, ATM, T1/fractional T1, LAN/LAN, & SDLC.
3. Upgradeable DIMM Memory up to 64Mb.
4. Multi-service capabilities: Voice/Video/Data.
5. (2) Interface modules to support interchangeable WAN cards at up to 1.544 Mbps.
6. (1) Interface module to support a variety of WAN, Voice, and LAN cards.
7. Security features to support VPN such as: IPSec, Des, 3Des, and Layer 2 Tunneling Protocol.
8. Telnet management and console interface.
9. 120 Volt AC, 19" rack mount hardware.

C. Provide with the following hardware:

1. 32MB Flash Memory.
2. 256MB of DRAM.
3. Redundant power supplies.
4. All necessary firmware and IP software to support the network modules.

D. Provide with the following Interfaces:

1. (2) 10/100 Base-TX Ethernet ports.
2. 1-port T1/fractional T1 WAN card with integral CSU/DSU.

2.07 EQUIPMENT RACKS AND CABINETS

A. Distribution Rack

1. Floor mounted open equipment rack: black extra heavy gauge aluminum and steel rack, 7 ft. High x 19 inches wide with EIA spacing suitable for 19-inch wide equipment, 3 inch wide rails, mounting holes on both sides, minimum 0.25-inch flange thickness and minimum 0.17-inch web thickness.

   a. For convenience, details and specifications based on "Universal Rack - Part # 46353-703" by Chatsworth. Other manufacturers offering acceptable products include Great Lakes Case & Cabinet Co. Inc. and Hoffman.

   b. Universal design based on 5/8 - 5/8 - 2 inch alternating hole pattern with rolled threaded holes for industry standard 12-24 mounting screws.

   c. All mounting and assembly hardware and 50 minimum rack mounting screws included.

   d. Minimum channel width of 3 inches. Racks include both bottom and top angle brackets.

e. Horizontal Wire Management Panels: Provided above and below each rack mounted equipment unit and patch panel. Provide 1 full height (7 foot) vertical wire management unit on each side of each rack.

f. Power Strip: 8-position power strip with 20 Amp circuit breaker and 12 ft. cord, similar to "Part # 7218" by Great Lakes, Part #CMRPSH20" by Panduit, or "Part #PR206" by Hubbell.

2. Wall Mounted Equipment Rack: Black anodized aluminum suitable for 19-inch wide equipment, 38.5 inches high x 10.25 inches wide x 18 inches deep, with 8-position power strip with 20 amp circuit breaker and 12 ft. cord. For convenience, details and specifications base on "Catalog # 11632-718" by Chatsworth. Other manufacturers offering acceptable products include Hoffman, Great Lakes Case & Cabinet Co., Inc and X-Mark CDT.

B. Distribution Cabinet

1. Floor Mounted Equipment Cabinet:

a. Manufacturers: For convenience, details and specifications base on "Catalog # P-DCP2288B" by Hoffman. Other manufacturers offering acceptable products include Chatsworth, Great Lakes Case & Cabinet Co., Inc and X-Mark CDT.

b. Cabinet: 87 inches high x 32 inches wide x 32 inches deep, suitable for 19-inch wide equipment with "black textured" finish and quick release side panels.

c. Front Door: Window door with locking handle; provide 5 keys for each lock.

d. Rear Door: Louvered with locking handle; provide 5 keys for each lock.

e. Power Strip: 8-position power strip with 20 amp circuit breaker and 12 foot cord.

f. Top: Vented top with integral fan tray; similar to "Cat. No. P-VT3F881".

g. Wire Management: Cable eye 8 each 4 inch size; similar to Catalog # P-CE86.

h. Cable Support: Provide sweep structure to support cables from overhead cable tray to data cabinet.

2. Wall Mounted Equipment Cabinet:

a. Manufacturers:

(1) For convenience, details and specifications based on following products by Great Lakes Case & Cabinet Co., Inc.

(a) 24 inch high cabinet "Part # GL24WM"

(b) 36 inch high cabinet....."Part # GL36WM"
(c) 48 inch high cabinet....."Part # GL48WM"

(2) Other manufacturers offering acceptable products include Chatsworth, X-Mark/CDT, Hoffman and Hubbell.

b. Cabinet: 22 inches wide x 25 inches deep x height required for equipment, suitable for 19-inch wide equipment, with Black color, black trim, and vented side panels.

c. Door: Plexiglas with lock; provide 5 keys for each lock.

d. Power Strip: 8-position power strip with circuit breaker and 12 foot cord.

e. Fan Assembly: Fan assembly with fan guards (2 fans).

f. Wire Management Rings: 4 inch size "Part # CM-44" by Great Lakes Case & Cabinet Co., Inc.

(1) 24 inch cabinet: ..... 2 each
(2) 36 inch cabinet: ..... 4 each
(3) 48 inch cabinet: ..... 6 each

C. Ladder-Type Cable Tray: Chatsworth "TELCO-Style Cable Runway," or equal by Square D, Newton or Wiremold. 12 inch wide to racks/cabinets from corridor or other wire routing space where indicated on Drawings.

2.08 POWER PROTECTION EQUIPMENT

A. Uninterruptible Power Supply Systems: Coordinate all installations with Owner. Coordinate electrical power requirements and required receptacle or service connection with Prime Contractor responsible for Electric Work and Owner. Select and provide UPS equipment that is sized per owner and equipment provider specifications.

2.09 CABLING COMPONENTS – PATCH CORDS:

A. Category 6 UTP Patch Cables - Provide [180] Patch Cords for Mildred B. Garvin MicroSociety Elementary School only. Langston Hughes ES and ES #5 do not get cabling.

1. Factory terminated and tested UTP patch cables and equipment cables for complete cabling system meeting requirements of ANSI/TIA/EIA-568-B for patch cord testing.

a. Manufactured in variety of standard lengths. Provide exact quantity as required to patch all rack terminated ports to network electronics ports.

b. Meet all requirements of ANSI/TIA/EIA 568-B.2 standard.

c. Contact plating of minimum of 50 micro inches of gold in contact area over 50 micro-inch of nickel, compliant with FCC part 68.5.

d. ANSI/TIA/EIA 568-B compliant.

e. Use 8-position connector, un-keyed.

f. Capable of universal T568A or T568B wiring schemes.

g. Modular connector maintaining paired construction of cable to facilitate minimum untwisting of wires.

h. Factory assembled and constructed of 100 ohm, 4-pair, 24 AWG, stranded conductor, unshielded twisted pair copper per requirements of ANSI/TIA/EIA 568-B standard for category 6 performance.

i. Performance marking indelibly labeled on jacket by manufacturer.

j. Accepts color-coded labels compliant with TIA/EIA-606 labeling specifications.

k. "Snagless" protection for locking tab to prevent snagging and to protect locking tab in tight locations.

l. Strain relief boot to protect UTP cable from excessive bending stress.

m. Manufactured by ISO 9001 registered company.

B. *Fiber Optical Patch* cords – Provide [36] Patch Cords

1. Fiber Optic Patch/Jumper Cables: Factory assembled optical fiber assemblies with multimode fiber and SC connectors at each end. Exact lengths determined in field and based on actual rack layouts. Provide ceramic connector sleeves.

   a. Cable Length: 3 meter long, unless otherwise specified. Verify quantity and length at time of installation.
   b. Provide all jumpers conforming to TIA 568-B Standard.

2. Manufacturer: Similar to "Corning Cable Systems, (xxxx01R3131003M, single-mode single fiber jumper, 3 meters in length. xxxx01K3141003, multimode 62.5 µm single fiber jumper, 3 meters in length, OR-611-50D-[XX]-[YYYY]-[ZZ]-C" by Ortronics or equal by Hubbell, Siemon or Nordx.

3. Provide actual quantity, type, and length required to install and interconnect all fiber backbone cabling as well as all network equipment.

2.10 EQUIPMENT LIST – BASE BID

A. Mildred B. Garvin Microsociety ES

GBICs		
WS-G5483=	1000BASE-T GBIC	10
WS-G5484=	GBIC-SX	2/IDF plus 4
2950T		
WS-C2950T-24	24 10/100 ports w/ 2 10/100/1000BASE-T ports, Enhanced Image	1
WS-C2950T-48-SI	48 10/100 and 2 10/100/1000BASE-T uplinks, Standard Image	2
3560-24 PWR		
WS-C3560-24-PS-S	24-10/100 inline power + 2 GBIC ports: SMI	1
CAB-AC	Power Cord,110V	1
3750-24		
WS-C3750G-24TS-S	Catalyst 3750 24 10/100/1000T + 4 SFP Standard Multilayer	1
UPS		
SU3000RMXL3U	SMARTUPS 3 KVA RACKMOUNT EXT. RUN UPS	1
WEXTWAR1YR-SB-13	1 year extended warranty on su3000rmxl3u	1
SU48R3XLBP*	Extended Battery Pack 2.2 Kva	1
AP9619	NETWORK MGT W/ENVIRONMENTAL MONITORING	1
3725 Router		
CISCO3725	3700 Series, 2-Slot, Dual FE, Multiservice Access Router	1
CAB-AC	Power Cord,110V	1

FL-SRST-MEDIUM	Feat Lic Survivable Remote Site Telephony up to 48 phones	1
MEM3725-128U192D	128 to 192MB DIMM DRAM factory upgrade for the Cisco 3725	1
MEM3725-32U64CF	32 to 64MB Cisco 3700 Compact Flash factory upgrade	1
NM-BLANK-PANEL	Blank Network Module Panel	1
NM-HDA-4FXS	High density analog voice/fax network module with 4 FXS	1
EM-HDA-4FXO	4-port voice/fax expansion module - FXO	1
S372CP-12305	Cisco 3725 Ser IOS IP PLUS	1
WIC-BLANK-PANEL	Blank WAN Interface Card Panel	3

Pix Firewall

CON-SNTP-Pix515FE	Smartnet 24x7x4 Chassis, unrestricted SW, FE, prts, VAC+	1
Pix-515E-UR-FE-BUN	Pix-515E-UR-FE bundle with chassis, unrestricted SW, 6FE, VAC+	1
CAB-AC	110V power cord	1
Pix-515E-VPN-3DES	Pix-515E-VPN-3DES/AES VPN/SSH/SSL encryption license	1
SF-Pix-6.3	Pix V6.3 software for the 515E, 525, 535 chassis	1
Pix-VAC-Plus	Pix 66MHz DES/3DES/AES VPN accelerator card+ (VAC+)	1
Pix-4FE-66	Pix 66MHz four port Ethernet int RJ45 card	1
Pix –515-UR-SW	Pix 515E Unrestricted UR feature license	1

[redacted]

GBICs

WS-G5483=	1000BASE-T GBIC	8
WS-G5484=	GBIC-SX	2

2950T

WS-C2950T-48-SI	48 10/100 and 2 10/100/1000BASE-T uplinks, Standard Image	3

3560-24 PWR

WS-C3560-24-PS-S	24-10/100 inline power + 2 GBIC ports: SMI	1
CAB-AC	Power Cord,110V	
CAB-AC	Power Cord,110V	1

UPS

SU3000RMXL3U	SMARTUPS 3 KVA RACKMOUNT EXT. RUN UPS	1
WEXTWAR1YR-SB-13	1 year extended warranty on su3000rmxl3u	
SU48R3XLBP*	Extended Battery Pack 2.2 Kva	(if VOIP)
AP9619	NETWORK MGT W/ENVIRONMENTAL MONITORING	1

[redacted]

Wireless Access-Point

AIR-AP1231G-A-K9	802.11g IOS AP w/Avail CBus Slot, FCC Cnfg
S12W7K9-12213JA	Cisco 1200 Series IOS WIRELESS LAN
AIR-PWR-CORD-NA	AIR Line Cord North America
AIR-ANT1728	5.2 dBi High Gain Omnidirectional Ceiling Mount Antenna
AIR-ANT4941	2.2 dBi Dipole Antenna (Standard Rubber Duck)
Wireless Coverage Survey	

B. Langston Hughes ES

GBICs		
WS-G5483=	1000BASE-T GBIC	10
WS-G5484=	GBIC-SX	2/IDF plus 4
2950T		
WS-C2950T-24	24 10/100 ports w/ 2 10/100/1000BASE-T ports, Enhanced Image	1
WS-C2950T-48-SI	48 10/100 and 2 10/100/1000BASE-T uplinks, Standard Image	2
3560-24 PWR		
WS-C3560-24-PS-S	24-10/100 inline power + 2 GBIC ports: SMI	1
CAB-AC	Power Cord,110V	1
3750-24		
WS-C3750G-24TS-S	Catalyst 3750 24 10/100/1000T + 4 SFP Standard Multilayer	1
UPS		
SU3000RMXL3U	SMARTUPS 3 KVA RACKMOUNT EXT. RUN UPS	1
WEXTWAR1YR-SB-13	1 year extended warranty on su3000rmxl3u	1
SU48R3XLBP*	Extended Battery Pack 2.2 Kva	1
AP9619	NETWORK MGT W/ENVIRONMENTAL MONITORING	1
3725 Router		
CISCO3725	3700 Series, 2-Slot, Dual FE, Multiservice Access Router	1
CAB-AC	Power Cord,110V	1
FL-SRST-MEDIUM	Feat Lic Survivable Remote Site Telephony up to 48 phones	1
MEM3725-128U192D	128 to 192MB DIMM DRAM factory upgrade for the Cisco 3725	1
MEM3725-32U64CF	32 to 64MB Cisco 3700 Compact Flash factory upgrade	1
NM-BLANK-PANEL	Blank Network Module Panel	1
NM-HDA-4FXS	High density analog voice/fax network module with 4 FXS	1
EM-HDA-4FXO	4-port voice/fax expansion module - FXO	1
S372CP-12305	Cisco 3725 Ser IOS IP PLUS	1
WIC-BLANK-PANEL	Blank WAN Interface Card Panel	3
Pix Firewall		
CON-SNTP-Pix515FE	Smartnet 24x7x4 Chassis, unrestricted SW, FE, prts, VAC+	1
Pix-515E-UR-FE-BUN	Pix-515E-UR-FE bundle with chassis, unrestricted SW, 6FE, VAC+	1
CAB-AC	110V power cord	1
Pix-515E-VPN-3DES	Pix-515E-VPN-3DES/AES VPN/SSH/SSL encryption license	1
SF-Pix-6.3	Pix V6.3 software for the 515E, 525, 535 chassis	1
Pix-VAC-Plus	Pix 66MHz DES/3DES/AES VPN accelerator card+ (VAC+)	1
Pix-4FE-66	Pix 66MHz four port Ethernet int RJ45 card	1
Pix –515-UR-SW	Pix 515E Unrestricted UR feature license	1